California Technology Assistance Project

Summary of Year 2003
School Technology Survey Findings

California Statewide Report

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EXECUTIVE SUMMARY

In early 2003 the California Department of Education (CDE) and the California Technology Assistance Project (CTAP) initiated a statewide assessment of the availability and distribution of educational technology resources in California's K-12 public schools. The research project served as a follow-up to similar data gathering efforts conducted in the prior three years, which sought to develop baseline data and develop a record of progress and improvement in the availability of educational technologies to public school children.

In order to gather data for the study, a detailed multi-part survey instrument was posted on the World Wide Web, and all schools in California were encouraged to login and provide data about the availability and uses of educational technologies at their respective school sites. Completion of the survey is a condition of education technology grants administered by CDE. This report presents the data, and subsequent analyses, from schools participating in the study.

Connectivity & Access[1]	**2000**	**2001**	**2002**	**2003**
Schools connected to the Internet	80%	90%	96%	98%
Classrooms connected to the Internet	58%	77%	84%	90%
Student/Computer Ratio	6.97	6.37	5.30	4.97
Student/Internet-Connected Computer Ratio	11.05	10.43	7.01	6.04
Student/Multimedia Computer Ratio	9.51	8.24	9.10	9.49

Connectivity & Access by School Type	**Elem**	**Md/Jr Hi**	**High**
Schools connected to the Internet			
2000	78%	85%	82%
2001	89%	93%	93%
2002	96%	98%	99%
2003	97%	99%	98%
Classrooms connected to the Internet			
2000	53%	60%	67%
2001	72%	76%	88%
2002	80%	83%	94%
2003	87%	91%	97%
Student/Computer Ratio			
2000	7.57	6.27	6.41
2001	6.96	6.29	5.51
2002	6.08	5.75	4.11
2003	5.66	5.33	3.86
Student/Multimedia Computer Ratio			
2000	10.59	9.51	7.93
2001	9.49	8.14	6.61
2002	12.47	11.32	5.56
2003	12.42	11.21	6.03

[1] See page 8 for a discussion of student/computer ratios and the definition of "Multimedia" computer used in this report.

Connectivity & Access by Measures of Poverty	**Free and Reduced-Price Lunch Eligible Enrollment**				
	0-20%	**21-40%**	**41-60%**	**61-80%**	**81-100%**
Schools connected to the Internet					
2000	81%	85%	80%	76%	74%
2001	91%	92%	88%	91%	89%
2002	97%	97%	95%	96%	96%
2003	98%	98%	97%	98%	98%
Classrooms connected to the Internet					
2000	70%	64%	62%	53%	39%
2001	87%	80%	78%	73%	67%
2002	93%	86%	82%	78%	80%
2003	94%	90%	88%	87%	92%
Student/Computer Ratio					
2000	6.37	5.85	7.27	7.17	9.14
2001	5.89	6.14	6.16	6.48	7.29
2002	4.74	5.06	5.27	5.68	6.13
2003	4.63	4.86	5.05	5.24	5.51
Student/Multimedia Computer Ratio					
2000	8.45	8.47	10.11	9.47	12.18
2001	7.10	7.47	8.12	8.82	9.96
2002	7.72	8.39	9.16	9.98	11.45
2003	8.84	9.40	9.88	10.06	10.49

CTAP 2003 School Technology Survey - Regional Comparison

	CA	CTAP Service Regions 1	2	3	4	5	6	7	8	9	10	11
Connectivity												
Schools												
2000	80%	85%	79%	84%	81%	88%	69%	79%	74%	86%	85%	89%
2001	90%	87%	88%	89%	91%	93%	83%	95%	90%	94%	92%	88%
2002	96%	95%	92%	94%	97%	95%	93%	97%	97%	100%	99%	95%
2003	98%	91%	95%	96%	97%	99%	97%	98%	97%	99%	99%	98%
Classrooms												
2000	58%	65%	81%	65%	73%	77%	62%	70%	67%	67%	63%	34%
2001	77%	86%	100%	78%	81%	89%	74%	94%	93%	83%	82%	58%
2002	84%	82%	96%	81%	87%	87%	86%	94%	89%	87%	87%	76%
2003	90%	88%	96%	89%	89%	94%	91%	96%	87%	93%	91%	88%
Computer Access												
Students/Computer												
2000	6.97	6.48	5.15	6.01	5.77	6.57	7.44	6.64	5.95	7.06	6.96	8.81
2001	6.37	5.84	3.84	5.25	6.03	5.78	6.66	5.49	5.57	6.47	6.53	7.54
2002	5.03	4.79	4.03	4.78	4.94	4.81	5.54	5.02	4.89	5.23	5.59	5.94
2003	4.97	4.60	3.69	4.91	4.62	4.48	5.10	4.57	4.49	4.91	5.38	5.51
Students/Multimedia Computer												
2000	9.51	8.99	6.30	7.89	9.15	8.57	11.21	8.84	7.70	8.87	9.09	12.12
2001	8.24	7.63	4.66	7.13	7.64	7.44	11.65	6.96	6.77	7.89	8.62	9.72
2002	9.10	9.44	8.38	8.22	8.42	8.52	9.30	8.75	8.73	8.91	9.90	9.64
2003	9.49	10.17	8.74	11.00	8.92	9.16	9.66	8.41	9.14	9.34	10.08	9.71

Counties represented in the 11 CTAP service regions:

1 Del Norte, Humboldt, Lake, Mendocino, Sonoma

2 Butte, Glen, Lassen, Modoc, Plumas, Shasta, Siskiyou, Tehama, Trinity

3 Alpine, Colusa, El Dorado, Nevada, Placer, Sacramento, Sierra, Sutter, Yolo, Yuba

4 Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Solano

5 Monterey, San Benito, Santa Clara, Santa Cruz

6 Amador, Calaveras, San Joaquin, Stanislaus, Tuolumne

7 Fresno, Kings, Madera, Mariposa, Merced, Tulare

8 Kern, San Luis Obispo, Santa Barbara, Ventura

9 Imperial, Orange, San Diego

10 Inyo, Mono, Riverside, San Bernardino

11 Los Angeles

INTRODUCTION

Throughout the 1990's, public education agencies at the federal, state, and local level have been engaged in efforts to infuse educational technologies into the schools. The federal No Child Left Behind legislation, specifically the Title II, Part D Enhancing Education Through Technology section, further emphasizes the use of technology to improve student academic achievement through the effective integration of technology in schools.

Progress in this task over the last decade has been significant, as the number of computers, Internet connected classrooms, and trained personnel has grown tremendously. Our work, however, is far from finished. Increasing technology use will be a continuous ongoing process for schools. In the last few years, as schools have acquired more computers, and high-speed connections to the Internet have become more common, new challenges and obstacles have arisen. There is a critical need in schools for trained technicians to repair and maintain computer equipment; system and network administration staff are often lured away from public schools by higher paying jobs in the corporate sector; and although teachers are rapidly developing basic computer competencies, many are still learning how to effectively integrate technology into the curriculum in ways that positively impact student learning. We have come a long way, but we recognize there remains a greater set of challenges before us. One of those challenges is dwindling financial resources for schools. As funding becomes scarcer, decisions to fund technology integration into teaching and learning become more difficult.

This research project, and the statewide and regional reports that it has generated, represents an effort by the State of California and its education agencies to identify those challenges. The project is unique in both the breadth and depth of detailed school-level data it presents, and in the ways in which the data are reported. It is on the vanguard of emerging state-level efforts across the nation to annually gather and report data on access and use of educational technologies according to student characteristics such as minority group membership and poverty. Further, it provides a multi-dimensional view of student access to computers, reporting several student/computer ratio measures. When considered in aggregate, these data present a complex, yet compelling, portrait of educational technologies in California's public K-12 schools.

Organization of the Report

A research project of this magnitude generates enormous amounts of raw data, and offers considerable opportunities for statistical analysis and reporting. The results are likely to be of great interest to the participating schools and school districts, but also to regional and state policymakers seeking to improve the quality of education for all students.

We have organized the report in the following manner: Each of the first six sections of the report focuses on a specific area, as outlined in the original survey. These areas include equipment, connectivity, technical support, curriculum support, technology use, and emerging technologies. For each section, we do not report every data element collected and analyzed in the survey, but rather highlight several selected survey findings.

As a supplement to the key findings in the first six sections of the report, Appendix B provides complete sets of all survey data, disaggregated in the following manner:

- California - All Schools
- Region - All Schools
- Region by School Type - Elementary
- Region by Minority Enrollment 61-80%
- Region by Minority Enrollment 81-100%
- Region by FRPLE Membership 0-20%

- Region by School Type - Middle/Jr High
- Region by School Type - High Schools
- Region by Minority Enrollment 0-20%
- Region by Minority Enrollment 21-40%
- Region by Minority Enrollment 41-60%
- Region by FRPLE Membership 21-40%
- Region by FRPLE Membership 41-60%
- Region by FRPLE Membership 61-80%
- Region by FRPLE Membership 81-100%

I. EQUIPMENT

Before viewing the data on student access to computers, it may be helpful to clarify several of the concepts and definitions related to technology access and student/computer ratios. This is an important step in understanding the findings of the report, since technology access can be measured and viewed in several ways.

Student/Computer Ratios

Over the last decade national attention has focused on the student-to-computer ratio as a measure of student access. As it is typically reported, it is computed by comparing the total number of students to the total number of computers within a specified geographic region or grouping of schools/districts. For example, a state or service region with 640,000 K-12 school children and 80,000 school computers would yield a student/computer ratio of 8.0 (640,000/80,000). This is important information, but it is not a complete portrait of student access to technology and the integration of technology to support teaching and learning.

Another method of reporting computer access measures the student/computer ratio at each school within a state or region, and then reports the average of those ratios. This measure more accurately reflects student access to computers because it accounts for the fact that students typically have access to school computers at only one school.

Types of Computers

When researchers attempt to identify trends by gathering data over successive years, several methodological challenges emerge. One of those challenges is the use of definitions: Over time, definitions tend to change as programs and policies evolve. This is particularly true of educational technologies, as computer processing speed and hard drive capacity milestones are reached, and the market for "new and improved" technologies remains vibrant. For these reasons, it is especially important to consider the evolving definition of the individual-use computer.

Based on these distinctions, the following abbreviations are used throughout the report to represent the different types of computers found in schools:

- **Computers** • Includes all computers reported in the survey
- **IC** • Internet-Connected Computers
- **MM** • Multimedia Computers[2]

[2] It should be noted that we define "recent-generation" or "up-to-date" multimedia computers as those no more than three years old; this is the same definition that was used in the 2002 survey. We recognize that a small percentage of older Multimedia computers may not be Internet-Capable, and we accept this potential discrepancy (though we consider it likely to be minor, if not insignificant) as a necessary limitation in the gathering and comparison of longitudinal data over several years.

Table 1.1 reports student access to computers based on statewide data. Again, for purposes of clarity, we note that these values are computed by comparing the total number of students to the total number of computers within the state.

TABLE 1.1 Equipment – Statewide Measures

	2003
Ratios	
Students/Computer	4.97
Students/IC Computer	6.04
Students/MM Computer	9.49
Computers/Classroom	4.38
IC Computers/Classroom	3.61
MM Computers/Classroom	2.29
Percentages	
IC Computers	82%
MM Computers	52%

Table 1.2 reports student access to computers, and the availability of computers in classrooms, based on the average of school-level student/computer ratios. Again, we note that this measure more accurately reflects access because students typically have access to school computers at only one school, and not at any school within a state or geographic region.

TABLE 1.2 Equipment - School Averages

	2003
Student Access Measures	
Students/Computer	6.31
Students/IC Computer	12.27
Students/MM Computer	24.63
Classroom Access Measures	
Computers/Classroom	4.23
IC Computers/Classroom	3.35
MM Computers/Classroom	2.06

In addition to interest in the Multimedia and connectivity capacities of the "basic" classroom computer, there are other computer traits which merit our attention. Indeed, we have shifted our focus toward computer "age," since this is an important dimension of long-term technology planning as computers reach the end of their average "life cycle" and need to be replaced. As computers become more commonplace in schools, they will need to be replaced not necessarily because they have become obsolete (as in previous years), but rather because they've simply "worn out." Table 1.3 presents estimates of the age of the current inventory of computers in schools. The values presented below are averages of estimates gathered at each school.

TABLE 1.3 Equipment - Estimates of Age of Current Computer Inventory[3]

	2003
Less than 1 year old	11%
Between 1 and 2 years old	22%
Between 2 and 3 years old	19%
Between 3 and 4 years old	16%
More than 4 years old	32%

Additional equipment and student access data, disaggregated by school type (elementary, middle/junior high, high), minority enrollment, and Free and Reduced Price Lunch Eligible (FRPLE) membership, is presented in Appendix B.

II. CONNECTIVITY

Connectivity is a critical component of school technology. Connectivity refers to the degree of telecommunications infrastructure present in schools, and the ability of schools to use that infrastructure to share information, access various instructional resources electronically, and access the Internet.

The survey collected data on the number of schools and classrooms with "dedicated, non-dial up" Internet connections. Table 2.1 reports Internet connectivity based on the sample's total number of connected schools and classrooms within the state.

TABLE 2.1 Internet Connectivity - Statewide Measures

	2003
Schools connected to the Internet	98%
Classrooms connected to the Internet	90%

Table 2.2 reports classroom Internet connectivity based on the average degree of connectivity measured at each school in the sample.

TABLE 2.2 Internet Connectivity - School Measures

	2003
Classrooms (avg)	89%
Schools with No Classrooms Connected	4%
Schools with All Classrooms Connected	64%

In concert with bandwidth, connectivity speed is an important consideration for the effective use of educational technologies. Table 2.3 reports the percentage of schools offering varying degrees of connectivity speed.

[3] May not add up to 100% since these are averages of values reported by individual schools.

TABLE 2.3 Internet Connectivity Speed

Connection Speed	CA
Less than 1.54 megabits	27%
1.54 megabits or greater, but less than 3.0 megabits	55%
3.0 megabits or greater, but less than 10 megabits	9%
10 megabits or greater, but less than 45 megabits	4%
45 megabits or greater, but less than 100 megabits	2%
100 megabits or greater, but less than 155 megabits	2%
155 megabits or greater, but less than 1 gigabit	0%
1 gigabit or greater	1%

Additional connectivity data, disaggregated by school type, minority enrollment, and FRPLE membership, is presented in Appendix B.

III. TECHNICAL SUPPORT

From the time computers first emerged in school classrooms, it has been necessary to support and maintain them. As the number of computers in schools has grown, the issue of technical support has become increasingly important.

Additional demands to create computer networks and help teachers integrate educational technologies with instruction has led many schools and districts to create personnel categories dedicated to technology use and management. In order to look at the total cost of ownership for computers and information systems in schools, it is important to look at all the internal and external support positions and contracts that schools have determined are necessary to establish and maintain a computer technology network.

In addition to presenting data on the absolute number of technical support personnel, we also present personnel numbers per 100 students, teachers, and computers. The purpose of selecting "100" as a measurement unit is not to set a desirable policy "target." To be sure, it is difficult to estimate exactly how many students, teachers, or computers can be adequately serviced through support personnel. However, by standardizing personnel measurement through the use of a common denominator (i.e., "per 100" of some unit), we can track progress from year-to-year and make cross-school comparisons, despite enrollment differences between schools, or enrollment changes in the same school from year to year. Table 3.1 reports the numbers of certificated and classified personnel responsible for providing technical support

TABLE 3.1 Technical Support - Average FTE Technology Support Personnel per School

	2003
Certificated Support Personnel (CE)	
CE/100 Students	0.05
CE/100 Teachers	0.96
CE/100 Computers	0.30
Percent of schools with NO CE	67%
Classified Support Personnel (CL)	
CL/100 Students	0.07
CL/100 Teachers	1.24
CL/100 Computers	0.35
Percent of schools with NO CL	48%

Survey respondents were also asked to estimate the time for support staff to respond to their needs. Although there is no universal minimum or maximum acceptable response time, it makes sense that response times should be minimized, since non-functioning equipment cannot impact student learning. Response time values may reflect the adequacy of the number of staff available, or the competencies of support providers (for example, low-skilled technicians may spend more time resolving each support issue). Table 3.2 reports estimated response times for hardware repair and technical support (e.g., help with system freeze/crash, etc.).

TABLE 3.2 - Estimated Repair and Support Response Time

	Hardware Repair	Support Response
2 hours or less	2%	15%
More than 2 hours, but by end of the day	9%	31%
Within 2-5 working days	50%	38%
More than a week, but less than a month	31%	12%
A month or more	8%	3%

Additional technical support data, disaggregated by school type, minority enrollment, and FRPLE membership, is presented in Appendix B.

IV. CURRICULUM SUPPORT

Support and training for the integration of computer technologies into daily lesson planning has emerged as a critical area in recent years. Most experts agree that, while acquiring hardware and connectivity is a necessary first step, computers will have little impact on students unless teachers become skilled in using them to challenge students, deliver content, and reinforce important concepts.

Tables 4.1 and 4.2 report numbers of certificated and classified personnel at each school responsible for providing support and training for curricular integration of educational technologies.

TABLE 4.1 Curriculum Support - Average Number of Certificated FTE Personnel per School

	2003
Staff Development Coordinator	0.09
Technology Resource Teacher	0.16
Other	0.05
Total	0.30
Percent of schools with NO Certificated curriculum support personnel	55%

of Classified FTE Personnel per School

	2003
Staff Development Coordinator	0.03
Technology Resource Teacher	0.12
Other	0.05
Total	0.21
Percent of schools with NO Classified curriculum support personnel	72%

TABLE 4.2 Curriculum Support - Average Number

Table 4.3 reports response times to teacher requests for assistance with integrating technology into the curriculum (such as understanding how to use Web resources in, for example, a unit on Egyptian history).

Table 4.3 Curricular Support Response Times

	Curricular Support Response
2 hours or less	9%
More than 2 hours, but by end of the day	23%
Within 2-5 working days	46%
More than a week, but less than a month	15%
A month or more	7%

Additional technical support data, disaggregated by school type, minority enrollment, and FRPLE membership, is presented in Appendix B.

V. TECHNOLOGY PLANNING & USE

Technology planning is the necessary first step toward the effective use of computers in classrooms. Table 5.1 provides data on school technology planning.

TABLE 5.1 Technology Planning

	Yes
Was your school involved in the creation/updating of your district technology plan?	66%
Does your school have a site plan that includes technology planning?	79%

Anecdotal accounts and small-scale case studies provide a great deal of insight about the uses of computer technologies in classrooms. There have been, however, few large-scale studies documenting the detailed and specific practices of teachers and their use of computers. Such research is time and labor-intensive.

Here, we attempt to provide some insight regarding the beliefs and practices of teachers, with the caveat that our data has limitations. For example, the school-level values we report are likely to reflect the input of only one or several individuals at a school, rather than the sum of responses from all teachers in each school. Still, this information can be of value to policymakers in identifying areas that merit further research. Table 5.2 reports the average school-level frequency of technology use by content area.[4]

TABLE 5.2 Reported Frequency of Technology Use by Content Area

	Daily	2-5 Days/Wk	Between Once/Wk and monthly	Less than monthly	Never
Reading/Language Arts	37%	33%	24%	5%	1%
Mathematics	28%	33%	29%	9%	2%
Science	12%	26%	41%	17%	3%
History/Social Science	11%	28%	42%	16%	3%

Additional technical support data, disaggregated by school type, minority enrollment, and FRPLE membership, is presented in Appendix B.

[4] Numbers may not add up to 100 percent due to rounding.

VI. EMERGING TECHNOLOGIES

This section reports data on trends and the uses of new or emerging technologies at schools. Note that home-school communications, and the use of e-mail, appear to be dominants trends.

Table 6.1 Prevalence of Emerging Technologies at Schools

Emerging Technology	
Using distance learning for students	9%
Using distance learning for teacher or administrator professional development	20%
Using an assessment model that explores the impact of technology on student achievement	14%
Partnering with business or the community on technology projects	22%
Using technology to improve communications between the school and the home	56%
Providing access to email and/or Internet for students at home	13%
Providing computers or other technology equipment for student use at home	13%
Providing access to email and/or Internet for staff at home	56%
Providing computers or other technology equipment for staff use at home	35%